

INTERAGENCY HELICOPTER OPERATIONS GUIDE

Chapter 12 - Fire Protection And Crash-Rescue

CHAPTER 12: FIRE PROTECTION AND CRASH-RESCUE.

- I. **Introduction.** Despite the best efforts of all involved in helicopter operations, it is recognized that accidents can and do occur. Within the limits inherent in operating at remote helibases, the potential for accidents demand an immediate and correct response to prevent serious injury or property damage.

The purpose and objectives of this chapter are to provide safe, cost-efficient, and effective fire protection and crash-rescue procedures for incident and project helibase operations. It prescribes minimum firefighting and crash-rescue operating requirements.

The guidance and requirements in this chapter are not intended to cover every contingency which may arise, nor does the chapter detail every rule of crash-rescue safety and practice. Specialized basic aircraft firefighting training should be sought to supplement the information contained herein.



IMPORTANT NOTE: It is not the intent of this guide, nor of most agencies involved in helicopter operations, to train helicopter and helibase management personnel to respond to a fully-involved aircraft fire. The intent is to train personnel to respond to small fires within their capability and training, and to be able to rescue survivors of a crash in a safe, efficient manner.

To this end, it is recommended that personnel assigned to the positions of Parking Tender or Deck Coordinator be trained in the proper use of fire extinguishers for aircraft fires. This training should include practical exercises extinguishing several small Class A and B fires with different types of extinguishers.¹



CAUTION: Flammable liquids are classified as hazardous materials, and approved training facilities (for example, local fire departments) must be utilized for the practical exercise.

- II. **On-Site Accident Preparedness Planning.** This chapter addresses on-site fire protection and crash-rescue preparedness. Agency-specific policy and directives usually require the local unit to develop an Aircraft Accident Preparedness Plan or Aircraft Emergency Response Guide. These plans and guides are discussed in more detail in Chapter 17. The unit preparedness plan usually addresses the large geographic area of a local unit's administrative boundaries, and is not site-specific.

However, some of the information required for site-specific accident preparedness planning

¹ The National Fire Protection Association video "Fighting Fires With Portable Extinguishers" (# NB-VC-31V) is recommended as a training aid.

INTERAGENCY HELICOPTER OPERATIONS GUIDE

Chapter 12 - Fire Protection And Crash-Rescue

at helibases should be available in the local unit's preparedness or accident preparedness plan. Information commonly available in the local unit's plan includes:

- # Name and location of hospitals and burn units within or near the unit's administrative boundaries;
- # Name, location, and method of contact for helicopter ambulance services.

The Helibase Manager or other air operations staff must obtain this information and incorporate it into the site-specific plan. Specific checklists and forms have been developed to assist on-site planning for emergency response and briefing Pilots on hazards. They include:

- # Form HBM-11, Helibase Emergency Response Plan (becomes part of the Medical Unit Plan on incidents);
- # Form HBM-12, Emergency Medical Services - Helicopter Ambulance Request Information;
- # Helibase Facilities, Hazard, And Flight Route Map;
- # Form HBM-2, Helispot Information Summary (identifies hazards on or near helispots);
- # Daily Helicopter Operations Briefing/Debriefing Checklist (Appendix F);
- # Helibase Manager's Reminders List (Appendix H).

Refer to Appendix B for instructions on completion. Utilization of these forms and checklists enhances the ability of the incident or project air operations staff to respond to an accident or other emergency in an organized, coordinated fashion.

The Crash-Rescue Plan Checklist shown in Exhibit 12-1 asks very specific questions regarding the readiness of helibase and other personnel to respond to a crash-rescue situation. It may be used by the Helibase Manager, Pilots, and other personnel in conjunction with the other job aids mentioned as a means of ensuring crash-rescue preparedness.

However, developing an accident preparedness plan for a specific site is not an end in itself, nor is it a guarantee that the emergency response will be effective. Preparedness must go beyond merely having a plan. Preparedness planning must be supplemented with briefings and drills to help reduce the confusion that often exists during emergency, crash-rescue operations.

INTERAGENCY HELICOPTER OPERATIONS GUIDE
Chapter 12 - Fire Protection And Crash-Rescue

Exhibit 12-1: Crash-Rescue Plan Checklist

CRASH / RESCUE PLAN CHECKLIST

- 1. Is crash/rescue equipment adequate to handle any emergency that may occur?**
- 2. Has the responsibility for the supervision of crash/rescue activities been clearly defined?**
- 3. Are crash/rescue personnel assigned specific duties?**
- 4. Can crash/rescue equipment readily reach all portions of the helibase area?**
- 5. Are helibase personnel familiar with procedures pertaining to crash rescue activities?**
- 6. Have contacts and plans been made with cooperators for crash/rescue assistance if needed?**
- 7. Are crash/rescue personnel instructed on the importance of not unnecessarily disturbing the aircraft wreckage for accident investigation purposes?**
- 8. Are crash/rescue personnel trained in first aid?**
- 9. Have provisions been made to dispatch a second helicopter to the crash/rescue scene for possible air evacuation?**
- 10. Are fire suppression crews instructed to stand by while crash/rescue helicopter is landing or taking off?**
- 11. Do helibase personnel understand their specific duties?**
- 12. Are minimum levels of crash/rescue training completed for assigned crews?**
- 13. Have the pilots been informed of the crash/rescue plan?**
- 14. Are all helibase personnel briefed on the plan?**

INTERAGENCY HELICOPTER OPERATIONS GUIDE

Chapter 12 - Fire Protection And Crash-Rescue

The effectiveness of a crash-rescue operation depends on:

- # How well the planning for various known and unknown factors in the accident has been performed;
- # How well those involved understand the plan; and,
- # How well they execute it.

As a minimum, the helibase preparedness plan should address:

- # Who will respond, by assignment;
- # What equipment and other facilities are available;
- # When the plan will be implemented;
- # Where equipment and medical facilities are located;
- # Why they are responding (type of accident);
- # How the plan will be implemented (notification).

Form HBM-11, Helibase Emergency Response Plan, when completed, will contain much of this information.



NOTE: All plans must be reviewed and updated daily as conditions, resources, and/or other personnel on the operating base change.

- III. **Types of Emergencies.** Consideration must be given to the type of aircraft emergencies that might occur, and where they might happen. Experience has shown that few helicopter accidents occur on the helibase itself. Helibase personnel should be aware that they may also be involved in responding to a fixed-wing airplane accident, or to a ground accident involving vehicles and/or personnel.

The accident preparedness plan must include a comprehensive response to emergencies, regardless of where they happen or who might be involved.

Types of aviation emergencies might include, but are not limited to the following:

- A. **In-Flight Emergency.** These types can include engine failure, fuel exhaustion, or dynamic flight component failure, (for example, failure of the tail rotor).

INTERAGENCY HELICOPTER OPERATIONS GUIDE

Chapter 12 - Fire Protection And Crash-Rescue

Pre-planning to cover these emergencies should include answers to the following:

- # Are passengers being regularly briefed on in-flight emergencies?
- # Have emergency landing areas near the helibase and on the incident or project area been identified and made known in the morning briefing?
- # Are these areas accessible by ground or by the identified medevac aircraft?
- # Are there limitations to ground access (bridges, gates) that will require that the entire response be by air?
- # Has an emergency response team and aircraft been identified?
- # Have helibase ground crews been briefed in the event the helicopter makes an emergency landing at the helibase?
- # Have helispot crews been briefed in the event the helicopter makes an emergency landing at the helispot?

- B. **Fueling Area Emergency.** The most likely emergency in the fueling area involves fuel spills, with the potential hazard of ignition. Prevention measures are discussed in detail in Chapter 13.

Preparedness planning to cover these emergencies might include answers to the following:

- # Are Parking Tenders aware of their responsibilities to have a fire extinguisher readily available during fueling operations?
- # Is there a spill plan in effect for the area of operation, and is it known?
- # Are spill notification procedures known (for example, to the local agency's hazardous materials specialist)?
- # Are resources available to deal with a fuel spill?

- C. **Helicopter Start-Up Emergency.** The most likely start-up emergencies include failure to untie the main rotor, doors or cowlings not secured, or an engine over-temperature condition during start.

Preparedness planning to cover these emergencies might include answers to the following:

- # Are Parking Tenders always in position during helicopter start up?

INTERAGENCY HELICOPTER OPERATIONS GUIDE
Chapter 12 - Fire Protection And Crash-Rescue

Have the Parking Tenders been briefed on start-up emergencies and responses?

- D. **Approach-Departure or External Load Operations Emergency.** Many helicopter accidents occur during approach to or departure from a remote landing area (helispot or unimproved landing site). Usual causes are obstructions to flight (wire, cable, or snag), an engine or dynamic flight control failure, or inadequate clearances.

Preparedness planning to cover these emergencies might include answers to the following:

Are extinguishers available at all helispots?

Is the site accessible (if not immediately adjacent to the landing area)?

Does the site have suburban or urban exposure (building, schools, houses, etc.)?

Is flight following adequate so that aircraft location is always known?

Have Pilots been briefed on area-wide hazards as identified on the incident or project map?

Have Pilots been briefed on hazards in the vicinity of each helispot utilizing Form HBM-2, Helispot Information Summary.

- E. **Other Hazards to Helicopters at Landing Sites.** Other landing area emergencies might involve vehicle or personnel movements when helicopters are operating, as well as other aircraft in the vicinity.

Preparedness planning to cover these emergencies might include answers to the following (these are covered extensively in Chapter 15):

Have adequate safeguards been provided to control vehicle and personnel movements on the landing area?

Are there warning signs posted?

Are Parking Tenders and other deck personnel (Loadmasters) alert to vehicle and/or personnel movement?

Are flight routes and hazards posted on the Helibase Facilities, Hazard, and Flight Route Map?

INTERAGENCY HELICOPTER OPERATIONS GUIDE

Chapter 12 - Fire Protection And Crash-Rescue

- IV. **Classes of Fire.** Fire is a result of a chemical chain reaction between fuel, heat and oxygen. This relationship is known as the fire tetrahedron (see Exhibit 12-2).

If one interrupts the chemical chain reaction, or takes away any of the other three elements, the fire is extinguished. This is what a fire extinguisher does.

Fire can develop with any number of different fuels, and extinguishers for one type of fuel are not always effective on other types of fuels. Fire is divided into four classifications depending on the type of fuel burning. Extinguishers are available for each type.

Exhibit 12-2: Fire Tetrahedron

FIRE TETRAHEDRON

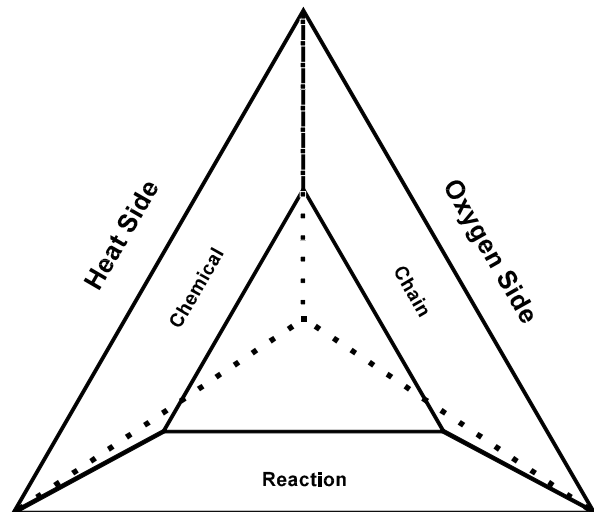


Chart 12-1: Classes of Fires

Class of Fire	Types Of Materials	Fuel Side	
		Type of Extinguisher	Symbol
A	Wood, cloth, paper, rubber, and plastics	Water	<u>Green</u> Triangle containing the letter "A"
B	Flammable or combustible liquids such as jet fuel, gasoline, oil, hydraulic fluids, solvents or similar materials	Carbon dioxide, foam, dry chemicals, or halon	<u>Red</u> Square containing the letter "B"
C	Energized electrical equipment that may present a shock hazard	Carbon dioxide (CO ₂) or halon	<u>Blue</u> Circle containing the letter "C"
D	Combustible metals such as magnesium or lithium	Dry <u>powder</u>	<u>Yellow</u> five-point star containing the letter "D"

INTERAGENCY HELICOPTER OPERATIONS GUIDE

Chapter 12 - Fire Protection And Crash-Rescue

- A. **Class A Fires.** (See Chart 12-1.) Class A fires involve wood, cloth, paper, rubber, and/or plastics. Water is often used to cool the fuels and extinguish the fire. Extinguishers suitable for Class A fires are identified by a triangle containing the letter "A". The triangle is colored green.
- B. **Class B Fires.** (See Chart 12-1.) Class B fires involve flammable or combustible liquids such as jet fuel, gasoline, oil, hydraulic fluids, solvents or similar materials. These fires require extinguishers like carbon dioxide, foam, dry chemicals, or halon². These extinguishing agents act to deprive the fire of oxygen or interfere with the chemical chain reaction. Extinguishers suitable for Class B fires are identified by a square containing the letter "B". The square is colored red.
- C. **Class C Fires.** (See Chart 12-1.) Class C fires involve energized electrical equipment that may present a shock hazard. These fires require de-energizing the electrical equipment and applying carbon dioxide (CO₂) or halon. Extinguishers suitable for "Class C" fires are identified by a circle containing the letter "C". The circle is colored blue.
- D. **Class D Fires.** (See Chart 12-1.) Class D fires involve combustible metals such as magnesium or lithium. These fires require a dry powder, which smothers the fire and doesn't react with the burning metal.

Extinguishers suitable for Class D fires are identified by a five-point star containing the letter "D". The star is colored yellow.



CAUTION: A "dry chemical" extinguisher should not be confused with a "dry powder" extinguisher. They are not the same.

- V. **Extinguishing Agents.** The grouping of fires into classes is important because the agents used to fight one class of fire may not be effective on fires of other classes. In fact, extinguishers designed for one class of fire may be extremely dangerous when used on other classes. For example, since it may spread the fire, a water extinguisher is not recommended for use on Class B or flammable liquid fires. Note that water can be highly effective when utilized by trained personnel.

While certain extinguishers such as multi-purpose dry chemical extinguishers can be used on Class A, B, and C fires, no extinguisher is effective on all four classes of fire.

² Note that halon-based extinguishing agents are soon to be replaced by substitutes that are less environmentally damaging.

INTERAGENCY HELICOPTER OPERATIONS GUIDE

Chapter 12 - Fire Protection And Crash-Rescue

Portable fire extinguishers come in a variety of sizes. Some weigh only 2½ pounds. However, the effectiveness of an extinguisher is not simply determined by its weight. It is also determined by the training and knowledge of the person using it. The single most critical element in firefighting is speed of reaction to the emergency. This means the person closest to the accident must know what to do, and do it immediately. Portable fire extinguishers are considered the first line of defense when a fire occurs, and are effective firefighting tools if used properly and on the fires for which they have been designed.

Types of extinguishers most commonly used are:

- A. **Water.** Water is very effective on Class A fires involving ordinary combustible materials. It may be applied from engines, portable hand pumps, or stored pressure extinguishers.



CAUTION: Water applied to energized electrical equipment presents a hazard from electric shock.

- B. **Foam.** Aqueous Film Foaming Foam (AFFF; commonly referred to as "A-Triple F") should not be confused with Class A wildland fire foams. AFFF is designed to extinguish Class B flammable liquid fires, but can also be effective on Class A fires. The foam creates a blanket which smothers the fire. An aqueous solution from the foam bubbles creates a vapor barrier over the fuel surface, preventing re-ignition of the fuel.



CAUTION: Foam applied to energized electrical equipment presents a hazard from electric shock.

- C. **Carbon Dioxide.** Carbon dioxide (CO₂) is a gas 1½ times heavier than air. It is non-poisonous and will not support combustion nor sustain life. The carbon dioxide extinguishers are suitable for Class B and C fires. It is discharged in a gaseous form and is easily affected by drafts or wind. It is non-corrosive, non-damaging, and leaves no residue.



CAUTION: The danger from CO₂ is the possibility of losing consciousness or being suffocated in an enclosed space or low-lying place.

- D. **Dry Chemical.** Dry chemicals consist principally of either bicarbonate of soda, potassium bicarbonate or ammonia phosphate and are used to smother the fire.

Dry chemical extinguishers are of two basic types. One type is pressurized by dry nitrogen or dry air, and the other has a cartridge with CO₂ under pressure. When the cartridge of the second type is punctured, CO₂ pressure expels the agent.

INTERAGENCY HELICOPTER OPERATIONS GUIDE

Chapter 12 - Fire Protection And Crash-Rescue

The danger from the dry chemical extinguisher lies in discharging it into an occupied crew or passenger compartment, or directing the stream into the escape path of occupants, causing a visual impairment. Dry chemical extinguishers are normally rated for Class B and C fires, but some are rated A, B, and C.



CAUTION: Some dry chemical extinguishers that are transported in vehicles have a tendency to pack solid from their own weight and vibration. They need to be removed periodically and be inverted so they may be discharged properly.

- E. **Halon.** Halon extinguishers are generally rated for Class B and C fires. Some may have a Class A rating as well. Halon, like CO₂, is a gas and will be affected by wind.



CAUTION: The use of halon on fire may produce toxic by-products. Use these extinguishers in a well ventilated area and avoid breathing the gas.

- F. **Dry Powder.** Two extinguishing agents are listed for use on Class D (combustible metal) fires.
1. **G-1 Powder.** G-1 Powder is a screened graphitized foundry coke with various phosphates added. The material acts as a heat conductor to lower the temperature of the burning metal. It forms a coating to smother the fire by excluding air, and may be used in magnesium and magnesium alloy fires.
 2. **Met-L-X Powder.** Met-L-X Powder has a sodium chloride base with additives. An additive fuses at high temperatures to aid in forming an air-tight coating. It may be used on magnesium, sodium, potassium, and sodium-potassium alloy fires.

VI. Requirements.

- A. **Extinguishing Agent for Helicopter Landing Areas.** The required extinguisher for helicopter landing areas is a 20-pound, dry chemical, 40 B:C-rated extinguisher (see Appendix K for ordering information).

This size extinguisher is lightweight, portable, self-contained, and highly effective on Class B (flammable liquid) fires. However, its effectiveness will always depend on the training and knowledge of the person using it.

INTERAGENCY HELICOPTER OPERATIONS GUIDE

Chapter 12 - Fire Protection And Crash-Rescue

- B. **Personal Protective Equipment.** Except in rare instances when the Pilot has recognized and/or declared an in-flight emergency, ground support personnel will have no advance notice of a helicopter emergency.

Therefore, personal protective equipment as identified in Chapter 9, Chart 9-2, shall be worn at all times by helibase support personnel so as not to delay an immediate response to the accident.



CAUTION: Clothing, either regular or fire resistant, affords little thermal protection from the radiated heat of aviation fuel fires. Extreme caution must be used by personnel approaching a burning aircraft.

CAUTION: Smoke from aircraft fires may contain toxic gases and/or minute particulates of combustion. Prolonged exposure without using self-contained breathing apparatus must be avoided.

Given the limitations and hazards outlined above, personnel must be trained and aware of the limitations to their response.

- C. **Emergency Tools and Equipment.** Emergency tools and equipment should be prominently positioned adjacent to the landing area(s). All helibase ground support and flight crews should be made aware of these locations. Crash-rescue equipment is required at helibases and at helispots which will see continued use over the course of an incident or project. Chapter 9 outlines the minimum requirements for fire extinguishers, evacuation kits, and crash-rescue kits at helicopter landing areas.

1. **Fire Extinguisher.** One (1) fire extinguisher per landing pad, located immediately adjacent to the safety circles for that pad in close proximity to the parking tender.
2. **Crash-Rescue Kit.** One (1) crash rescue kit or equivalent per every five (5) helicopters using the landing area. The kit contains crash axes, hacksaw with blade, bolt cutter, seat belt cutter, and door opener tool. It is used to gain access to the crew and passenger compartments if normal exits are rendered unusable in the accident sequence.
3. **Evacuation Kit.** One (1) evacuation kit per every five (5) helicopters using the landing area. The kit contains a first aid kit, splints, blanket, ground marker head lamp, and stretcher to provide for evacuation of injured personnel from the accident scene.



NOTE: Check kits upon receipt to assure content, conditions and suitability of tools and equipment.

INTERAGENCY HELICOPTER OPERATIONS GUIDE
Chapter 12 - Fire Protection And Crash-Rescue

- D. **Additional Crash-Rescue Resources at Helibases.** The basic extinguisher requirement may be supplemented by foam-equipped engines, a plumbed system, or other methods.



CAUTION: It is not recommended that agency personnel in a foam-equipped engine be assigned helibase crash-rescue duties unless they have received advanced aircraft firefighting training, and are clothed and equipped to respond safely.

Trained personnel and equipment are available from fire departments and military bases. Air operations staff must weigh the cost of such resources versus the probability of an aircraft fire occurring. Another factor to consider is the proximity of the helibase to urban or suburban development. In this case, ordering fully-equipped crash-rescue services may be prudent.

Care must be given to the placement of emergency response vehicles and equipment near the landing pad. Emergency equipment should have immediate access, but must not hinder normal flight or ground operations.

VII. **Strategy and Tactics.**

- A. **Strategy.** The primary objective of helicopter or helibase ground support personnel participating in rescue and firefighting (RFF) activities is to prevent loss of life or property. If needed, firefighting action should provide maximum fuselage integrity and an escape path for its occupants. To the extent possible, RFF personnel should assist in evacuation of the helicopter using normal or emergency means of egress.

The most important factors involved in effective rescue and firefighting effort in a survivable helicopter accident are:

- Training received
- The effectiveness of crash-rescue and extrication equipment
- The speed with which RFF personnel and equipment can be mobilized and utilized
- Placement of equipment and personnel

All the above factors are interrelated. In every case, the actions taken are collectively aimed at providing the most immediate attention possible to survivors of the accident.

INTERAGENCY HELICOPTER OPERATIONS GUIDE
Chapter 12 - Fire Protection And Crash-Rescue

- B. **Tactics.** One of the most important skills in rescue and firefighting is the ability to improvise. Every emergency response is unique, and accident sequences often occur in an unforeseen manner. Being able to adjust the response to fit the situation is an absolute necessity.

However, improvisation does not stand alone. Its importance, and the likelihood of the need to improvise, is never a valid reason for not learning and drilling in the fundamentals. Without basic RFF skills, the individual or RFF team has no foundation upon which to improvise. Without experience in using those skills, they will lack the judgment necessary for safe, effective crash-rescue.

Before effective action may be taken, RFF personnel must be familiar with the various attributes and characteristics of the helicopter(s) involved in the accident.

1. **Helicopter Makes and Models.** Crash-rescue diagrams of the most frequently used helicopters are provided in Appendix M of this guide. These diagrams provide only the general features of a model of helicopter. Some of the diagrams have emergency procedures (fuel/battery shutoff) attached.
2. **Briefings.** Since the diagrams provide only information generic to a model, they must be supplemented by on-site review or briefings which address the specific features of each helicopter assigned. Briefing material should include, but is not limited to:
 - Door operation
 - Emergency exits: location and operation
 - Location and operation of the Emergency Locator Transmitter (ELT)
 - Locations of the first aid kit and fire extinguisher(s)
 - Operation of crew/passenger restraint devices
 - Emergency shut-down procedures for the battery, fuel, and other aircraft systems.



NOTE: All of the above briefing items are a standard part of the Aircraft Safety Briefing required to be given to all passengers (see Chapter 10). Prior to the commencement of operations, it is particularly important that all RFF personnel be given a more in-depth briefing on these items.

INTERAGENCY HELICOPTER OPERATIONS GUIDE
Chapter 12 - Fire Protection And Crash-Rescue

3. **Factors Influencing Tactics.** RFF tactics employed at the accident scene are largely dependant upon many varying factors, including but not limited to:
- Terrain and obstacles
 - Wind direction
 - Type of helicopter(s) involved
 - Crew stations and passenger locations within the helicopter
 - If a fire results, its location and the degree of fire involvement
 - Other mission-specific equipment attached (for example, helitorch, plastic sphere dispenser, external cargo or water loads, hazardous materials such as fireline explosives, detonators, fusees, gas cans, or ordnance carried by law enforcement personnel)
4. **Sequence of Actions.** Recognizing that accident sequences are all different, there is a general sequence of actions that can usually be followed:
- a. **Approach.** After an alarm has been received, or a crash has occurred, the most direct route offering the least obstacles should be utilized. The normal precautions on approaching helicopters should be taken. These include, but are not limited to:
- Approach from the front or side
 - Approach from ground that is lower than that on which the helicopter is resting
 - Carry all equipment horizontally at waist level, not over the shoulder
 - Do not approach until the rotors, or other moving components are at rest



CAUTION: It is not unusual in a crash sequence for the rotating blades to strike obstacles or the ground, with debris thrown a considerable distance from the accident site. Evaluate the situation before approaching. It is usually wise to take the nearest available cover, or lie prone, as an accident sequence is occurring.

The first person responding ("first responder") will need to evaluate the best approach to the helicopter if the rotor blades or other components are still moving. Factors involved in this decision are an assessment of:

INTERAGENCY HELICOPTER OPERATIONS GUIDE
Chapter 12 - Fire Protection And Crash-Rescue

- Will still-moving components soon come to rest?
- Are the Pilot or other occupants attempting to shut the helicopter down?
- Is it a survivable accident?
- Is fire, or the potential for fire, present?
- Can the helicopter be approached with any assurance of safety?

If the decision is made that the first responder will shut it down, other responders should stand by until that task is accomplished. Do not expose more personnel than are absolutely necessary to a hazard.

If fire is present, the best approach is usually from upwind so that the responder is not hindered by smoke or heat. Extinguishing agents are also more effective when applied from upwind. However, the first and any follow-up responder(s) will need to evaluate the site-specific conditions before approaching.



CAUTION: When approaching the helicopter with extinguishers, engines, or other apparatus, do not block the escape path of the occupants. Do not direct streams of extinguishing agents at them which could cause them to become disoriented.



CAUTION: Helicopter structures damaged by fire or impact forces are often very unstable and are subject to collapse or rollover. If these conditions are suspected to exist, precautions in the form of blocking or shoring should begin as soon as possible to ensure the safety of RFF personnel working on evacuation.

- b. **Entry.** When the helicopter can be safely approached and entered, the first responder should assist the survivors in leaving the aircraft. Depending upon make and model, an entry/exit door or doors may be found on each side of the helicopter.

Smaller helicopters have doors that usually open outward and are hinged on the forward side. The inside is fastened by a latch that is usually operated by pulling the latch mechanism.

Other larger helicopters usually have front flight crew doors similar to those on smaller helicopters. However, the doors on the passenger compartment(s) are usually the sliding type. Most often they slide from front to rear.

INTERAGENCY HELICOPTER OPERATIONS GUIDE
Chapter 12 - Fire Protection And Crash-Rescue

On most helicopters, an emergency release mechanism is installed at the hinge side and is operated by pulling on the jettison handle.

Escape hatches or escape panels are provided on some helicopters and are made of either plexiglass or metal. The hatches should have an external release handle, with the location and operating procedures marked on the adjacent surface of the fuselage.

If access is hindered for whatever reason, emergency cut-in using a crash axe should be in the area of the doors, windows, or windscreen.



CAUTION: Avoid structural areas of the fuselage where use of the axe or other tools might rupture fuel, electrical, or oxygen lines, causing an explosion and/or fire.



CAUTION: Extreme care should be utilized when cutting into the aircraft. Occupants might be injured by penetrating too far into the aircraft. Be very aware also that cutting action may create sparks which might ignite fuel vapors. Evaluate the situation first.

c. **Rescue of Occupants.** After entrance to the flight and/or passenger compartments is achieved, the RFF should perform the following, in order:

- (1) First locate, then determine the condition of the occupants;
- (2) Evacuate uninjured occupants first, if feasible;
- (3) Evacuate injured occupants.



CAUTION: Extreme care must be utilized when removing injured personnel to prevent aggravation of existing injuries or causing additional ones. Due to the high vertical deceleration forces caused in a helicopter hard landing or accident, lower back injuries should be assumed to be present. If possible, assistance from trained medical personnel should be obtained before moving injured personnel.

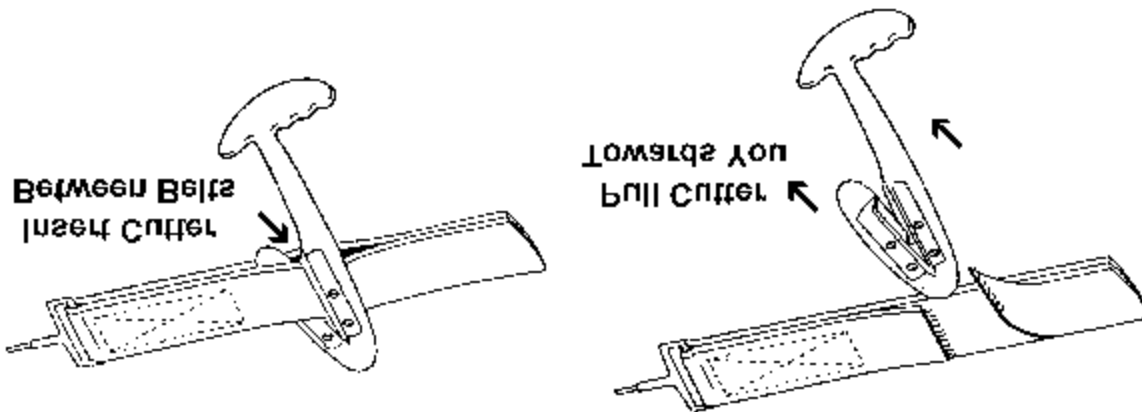
If immediate evacuation is not possible due to wreckage configuration or occupants being pinned within the compartment, and fire is present, the RFF should attempt to keep the fire away from the area where personnel are trapped.

INTERAGENCY HELICOPTER OPERATIONS GUIDE
Chapter 12 - Fire Protection And Crash-Rescue

All helicopter seats have seat belts. Front seats also have shoulder harnesses; rear seats may also have them. Both belts and harnesses are necessarily constructed of very strong webbed material and are difficult to cut. It is therefore necessary that RFF personnel be knowledgeable of release procedures.

Release configuration varies among make and model of helicopter, and may even vary among seats in the same helicopter. If the belt or harness cannot be released normally, utilize the seat belt cutter included in the crash-rescue kit (see Exhibit 12-3).

EXHIBIT 12-3: SEAT BELT CUTTER



- d. **Fatalities.** In any emergency triage situation, common sense dictates that personnel who have been fatally injured receive lesser priority for evacuation from the aircraft than those still alive.

Additionally, personnel should not take additional risks to remove a fatally injured individual from an aircraft if the RFF personnel themselves will be at risk from existing fire, potential fire, or other hazards. In an accident involving fatalities, remember:



- Contact the local Coroner to make the legal determination of fatality.
- Do not release name(s) (applies to all involved in the accident).

Fatalities are also discussed at the end of this chapter.

INTERAGENCY HELICOPTER OPERATIONS GUIDE
Chapter 12 - Fire Protection And Crash-Rescue

- e. **Evacuation Off-Site.** After all occupants have been accounted for, medical injuries should be treated to the extent possible and only within the skill level of those present. Personnel should be prepared for transport to the appropriate medical facility.

While RFF personnel are performing the evacuation, it is critical that the helibase Aircraft Base Radio Operator or other individual assigned be making the contacts identified in the Medical Unit Plan and/or in Form HBM-11, Helibase Emergency Rescue Plan. Note that for project operations, initial contact is usually made with the local dispatch office, who will implement the unit accident preparedness plan.

If appropriate (that is, accident scene is not at a location with known conditions), the Radio Operator should utilize Form HBM-12, Emergency Medical Services - Helicopter Ambulance Request Information, to obtain and relay information. See Appendix B for further information and discussion. In order to avoid time delays in what may be a life-threatening situation, it is essential that the Radio Operator obtain as much information on the Helicopter Ambulance Request as possible.

Evacuation of injured personnel should be planned before the operation begins. It is impossible to detail all evacuation situations or options that may exist. Nonetheless, operations can be planned to some extent:

- Evaluate all assigned helicopters for each's evacuation capability and designate a primary and, if feasible, a backup (different helicopters may also be assigned to ambulatory and non-ambulatory roles);
- Brief all helicopter Pilots, crews, and helibase personnel on roles, responsibilities, and procedures;
- Coordinate closely with the local dispatch or other responsible office both in preparedness planning and during the actual evacuation.

Inclement conditions (weather, nighttime) may exist for aerial medevac. Remember the Pilot has the final authority on performing the mission. Refer to Chapter 6 for guidance on emergency flights.

- VIII. **Preservation of the Accident Scene.** Following extrication and evacuation of the occupants, preservation of the accident scene and documentation of actions taken is vitally important in the accident investigation that will follow.

The accident scene and perimeter should be immediately roped or flagged off. Security should be provided to prevent entry by unauthorized personnel. Any person not actively engaged in the rescue or firefighting operation should be denied entry to the area. The Incident Command Staff or the Project Aviation Manager should be briefed away from the immediate accident scene.

INTERAGENCY HELICOPTER OPERATIONS GUIDE
Chapter 12 - Fire Protection And Crash-Rescue

The Helibase Manager or other official in charge should ensure that RFF and other helibase personnel immediately document the following:

- Condition and position of the aircraft structure prior to any significant cutting or alteration of the aircraft took place, including its initial position before the accident, position when it came to rest, and position after evacuation and extrication was performed. Use written statements, sketches, and photos or video. Document sounds heard, one's own actions, actions of others, etc.



IMPORTANT NOTE: It is essential to the investigation team that personnel involved in the accident do not coordinate their statements. Have each individual independently document the occurrence.

- Secure and preserve all helibase documentation for that operational period, including Helibase Mission Request Logs, Flight Following Logs, load calculations and manifests, Unit Logs, Helibase Organization Chart, Daily Helicopter Operations Briefing/Debriefing Checklist, and other relevant material.
- Removal of the bodies of fatally injured victims remaining in the wreckage should be accomplished only by, or under the direction of the responsible medical examiner (coroner). Premature removal can interfere with identification and/or destroy required pathological evidence required. If body removal is necessary to prevent further incineration, the original location of the body and the body itself should be tagged or otherwise identified, and the facts reported to the investigation team.



BE AWARE AND BE PREPARED

"SOMEONE'S LIFE MAY DEPEND ON YOUR ACTIONS."